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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,006	04/13/2004	Bo Soon Chang	CYPR-PM01032.DIV	5958

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EXAMINER

DOLAN, JENNIFER M

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 04/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/824,006	Applicant(s) CHANG ET AL.	
	Examiner Jennifer M. Dolan	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-29 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 17-29 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Objections

1. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

The second occurrence of claim 28 has been renumbered as claim 29.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,549,716 to Takahashi et al. in view of Japanese Patent Publication JP 57-167657 to Hokozaiki et al.

Regarding claim 17, Takahashi discloses a universal packaging system (figure 1) for back-end manufacturing of ICs (see column 3, lines 20-55) comprising: a front-of-line portion for receiving (1) a die strip (2) and for processing the die-strip using a first plurality of processes (3-10) that function independently of the die size of the strip (see column 1, lines 53-60; column 2, lines 5-10, 50-57; column 4, line 65 – column 5, line 55; “diversified” production, the use of a

“through-line” or “conveyor”, and the use of cameras rather than mechanical means for die-strip alignment indicate that the process is compatible with different-sized dice); a first part of an end-of-line portion for receiving the die-strip and processing through a second plurality of processes that function independently of the die size (figure 2; column 3, line 55 – column 4, line 8; independence of die size is based on same reasons listed supra for the front-of-line portion); and a sawing process for receiving the die-strip from the first part and for sawing the die strip into individual devices (column 5, lines 60 – 67).

Although it is apparent that the sawing apparatus is receiving some sort of control signal to determine where the saw lines are to be placed, Takahashi fails to teach the means by which this is accomplished.

Hokozaki teaches the usage of a computer database and computer control for providing the size of the die to be scribed, and using the die size information to scribe the devices (see ‘Constitution’).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to specify in the system of Takahashi that the sawing process is controlled by a computer having a memory database for storing die size, as suggested by Hokozaki. The rationale is as follows: A person having ordinary skill in the art would have been motivated to use a computer controller and database for die size, because in order to accommodate diverse chips, as suggested by Takahashi, the sawing apparatus would either need to have cutting line positions supplied by the controller (as in Hokozaki), or to determine the position of the cutting lines through a measuring or detection process. Since Takahashi does not disclose the nature of the sawing control system, a person having ordinary skill in the art would have been motivated to

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look to the prior art for any efficient and effective alternate methods for cleaving a die of any size, such as the method taught by Hokoziaki (also see 'Purpose' section of Hokoziaki).

Furthermore, a person skilled in the art would prefer a system using a database for die size values rather than a system using an active measurement, because a measurement-type system would require additional cameras or measuring apparatuses, as well as additional fabrication complexity.

Regarding claim 18, Takahashi discloses a sorting process (column 6, lines 1-14) for receiving the devices from the sawing process and for sorting the individual devices (figure 2, column 6, lines 1-14), the sawing and sorting process being a second part of the end-of-line portion (figure 2).

Regarding claim 19, it is implicit that a computer control system is controlling the front-of-line portion, the end-of-line portion, and the sorting process, because Takahashi teaches that the processes is 'unmanned' (column 2, lines 50-55) and that device transfer, alignment, and sorting occurs through binary image processing from the cameras (column 4, lines 20-55), which would require a computer to process the image and decide how to align the chip or whether to dispose of the chip.

Regarding claim 20, Takahashi discloses an automated in-line cure process (12).

4. Claims 17, 20-23, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,465,743 to Owens in view of Hokoziaki et al. and U.S. Patent No. 4,674,670 to Watanabe et al.

Regarding claims 17, 20-23 and 26, Owens discloses a packaging system comprising: a front-of line portion (column 3, line 65 – column 4, line 17) for receiving and processing the die strip using a plurality of automated, in-line processes (column 3, line 65 – column 4, line 17; die-attach, cleaning, and wire-bonding processes); an in-line mold process, cure process, and an in-line solder ball attach process, the solder ball process utilized on copper (38) and plastic (12) for processing the die-strip after the front-of-line process (column 4, lines 17-45); and an end-of-line sawing process for sawing the die-strip into individual devices (column 4, lines 53-56; the term ‘dicing’ indicates sawing).

Owens fails to disclose that the front-of-line and back-end processes are independent of the die size. Owens further fails to disclose that the die size is obtained using a computer database.

Hokozaki teaches the usage of a computer database and computer control for providing the size of the die to be scribed, and using the die size information to scribe the devices (see ‘Constitution’).

Watanabe discloses general-purpose automated die assembly equipment, wherein the conveyance means has an adjustable width to hold any die size (column 5, lines 1-5) and where camera and computer controls are used to properly align any size die in the apparatus (column 2, lines 10-20, column 3, lines 1-15; column 5, lines 1-30).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Owens, such that any size die is accommodated, as suggested by Watanabe, and such that die size is supplied by a computer database, as suggested by Hokozaki. The rationale is as follows: A person having ordinary skill in the art would have

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been motivated to modify the system of Owens, such that any size die is accommodated in the in-line assembly apparatuses, because using generalized equipment with conveyance and alignment means independent of die size allows the die assembly system to be used with any device, rather than requiring the system to be dedicated to a single device type, which increases the flexibility, cycle speed, and degree of automation of the system (see Watanabe, column 1, lines 5-20, 50-60; column 2, lines 22-30). A person having ordinary skill in the art would further have been motivated to use a computer controller and database for die size, because in order to accommodate diverse chips, the sawing apparatus would either need to have cutting line positions supplied by the controller (as in Hokozaiki), or to determine the position of the cutting lines through a measuring or detection process. Since Owens does not disclose the nature of the sawing control system, a person having ordinary skill in the art would have been motivated to look to the prior art for any effective and efficient methods for cleaving a die of any size, such as the method taught by Hokozaiki (also see 'Purpose' section of Hokozaiki). Furthermore, a person skilled in the art would prefer a system using a database for die size values rather than a system using an active measurement, because a measurement-type system would require additional cameras or measuring apparatuses, as well as additional fabrication complexity.

5. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi in view of Hokozaiki, as applied to claim 17 above, and further in view of U.S. Patent No. 5,336,931 to Juskey et al.

Takahashi discloses that the front-of-line portion comprises: an in-line die attachment process (4), an in-line cure process (6) coupled to the die-attachment process, and an in-line bond process (7) coupled to the cure process, all functioning independently of die size

Takahashi fails to teach a plasma cleaning process immediately before and a second plasma clean after the wirebonding.

Juskey teaches that in conventional die assembly, a plasma clean process occurs immediately before and after the wirebonding (figure 3; column 5, lines 5-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Takahashi in view of Hokozaiki, such that plasma clean steps are added immediately before and after the wirebonding, as suggested by Juskey. The rationale is as follows: A person having ordinary skill in the art would have been motivated to add plasma cleaning steps, because plasma cleaning is conventional before wirebonding in order to ensure that the wirebonding pads on the device are sufficiently clean of debris or residual adhesive for a high-integrity wirebond and after wirebonding, to remove residues from wirebonding and ensure that the encapsulant disposed on the surface in the subsequent step will adhere to the surface, as is notoriously old, conventional, and well known in the art.

6. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi in view of Hokozaiki, as applied to claim 17 above, and further in view of U.S. Patent No. 5,499,717 to Hayashi.

Takahashi discloses testing, sorting, and tray storage processes coupled to the end-of-line portion (column 6, lines 1-15).

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Takahashi fails to teach storing the devices on a reeled tape.

Hayashi teaches storage of finished chips on a reeled tape (column 1, lines 10-25).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Takahashi in view of Hokozaiki, such that the finished chips are stored in a reeled tape, as suggested by Hayashi. The rationale is as follows: A person having ordinary skill in the art would have been motivated to store the chips in a reeled tape, because reeled tape temporary carriers are old and well known in the art of electronic assemblies, and provide the additional advantages of compact storage, protection of the devices, and compatibility with apparatuses for automated mounting of the parts (also see Hayashi, column 1, lines 10-25).

7. Claims 18 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Owens in view of Hokozaiki et al. and Watanabe et al. as applied to claims 17 and 26 above, and further in view Takahashi et al.

Owens fails to disclose a system of testing and sorting the devices.

Takahashi discloses an end-of-line portion including a testing and sorting process (column 6, lines 1-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the testing and sorting process suggested by Takahashi to the packaging system of Owens as modified by Hokozaiki and Watanabe. The rationale is as follows: A person having ordinary skill in the art would have been motivated to add a testing and sorting process, in order

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to find and eliminate defective integrated circuits, such that they are not further processed or installed on a circuit board (see Takahashi, column 6, lines 1-15).

8. Claims 24 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Owens in view of Hokozaki et al. and Watanabe et al., as applied to claims 17 and 26 above, and further in view of Juskey et al.

Owens discloses in-line die-attach/cure processes (in die-attach machine; see column 3, line 60 – column 4, line 9), a cleaning process (column 4, lines 9-12), and a wirebonding process (column 4, lines 12 – 18).

Owens fails to teach plasma clean processes before and after the wirebonding process.

Juskey teaches that in conventional die assembly, a plasma clean process occurs immediately before and after the wirebonding (figure 3; column 5, lines 5-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Owens in view of Hokozaki and Watanabe, such that plasma clean steps are added immediately before and after the wirebonding, as suggested by Juskey. The rationale is as follows: A person having ordinary skill in the art would have been motivated to add plasma cleaning steps, because plasma cleaning is conventional before wirebonding in order to ensure that the wirebonding pads on the device are sufficiently clean of debris or residual adhesive for a high-integrity wirebond and after wirebonding, to remove residues from wirebonding and ensure that the encapsulant disposed on the surface in the subsequent step will adhere to the surface, as is notoriously old, conventional, and well known in the art.

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9. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Owens in view of Hokozaiki et al. and Watanabe et al. and further in view Takahashi et al. as applied to claim 27 above, and further in view of Hayashi.

The combination of Owens in view of Hokozaiki, Watanabe, and Takahashi, as applied to claim 27, supra, discloses the assembly process comprising a test process.

Owens fails to disclose storage of devices in a reeled tape.

Hayashi teaches storage of finished chips on a reeled tape (column 1, lines 10-25).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Owens as modified by Hokozaiki, Watanabe, and Takahashi, such that the finished chips are stored in a reeled tape, as suggested by Hayashi. The rationale is as follows: A person having ordinary skill in the art would have been motivated to store the chips in a reeled tape, because reeled tape temporary carriers are old and well known in the art of electronic assemblies, and provide the additional advantages of compact storage, protection of the devices, and compatibility with apparatuses for automated mounting of the parts (also see Hayashi, column 1, lines 10-25).

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. U.S. Patent Publication No. 2002/0177875 to Tsui et al, U.S. Patent No.

6,522,940 to Erck et al, U.S. Patent No. 3,814,895 to Fredriksen, and Japanese Patent

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Publication 06-224,293 to Nishiguchi disclose automated sawing apparatuses for cutting dice of varying sizes.

b. U.S. Patent No. 6,574,858 to Hembree, U.S. Patent No. 6,049,624 to Wilson et al., U.S. Patent No. 5,915,231 to Beffa, and U.S. Patent No. 4,301,958 to Hatakenaka et al. disclose in-line or automated "non-lot-based" die assembly systems

c. U.S. Patent No. 5,865,319 to Okuda et al. discloses an in-line, automated testing and sorting system.

d. U.S. Patent No. 6,230,719 to Wensel discloses an in-line front-of-line system including plasma clean steps.

e. U.S. Patent No. 6,105,783 to Sato discloses use of a carrier tape wound in a reel for temporary storage of semiconductor devices.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (571) 272-1690. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

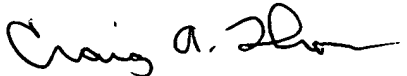
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer M. Dolan
Examiner
Art Unit 2813

jmd


CRAIG A. THOMPSON
PRIMARY EXAMINER